We claim:

1. A hybrid photoactive device comprising:

(a) a photoactive semiconductor; and

(b) a plurality of chlorosomes supported in light communicating relation to a surface of the photoactive semiconductor.

2. The hybrid photoactive device according to claim 1, wherein the chlorosomes comprise a cytoplasmic membrane sack of photosensitive molecular structures and a baseplate, at least a substantial number of chlorosomes being oriented with their baseplates facing the photoactive semiconductor and their cytoplasmic sack facing away from the photoactive semiconductor.

3. The hybrid photoactive device according to claim 1, wherein the photoactive semiconductor has a light response that is diminished at a first range of light wavelengths, and the chlorosomes have a light response that is enhanced at a second range of light wavelengths that coincides, at least in part, with the first range of light wavelengths and a emission in the direction of the photoactive semiconductor of light outside the first range of light wavelengths.

4. The hybrid photoactive device according to claim 3, wherein the photoactive semiconductor is a silicon photovolaic cell.

5. The hybrid photoactive device according to claim 1, wherein at least a majority of the chlorosomes are oriented in a light emitting direction toward the photoactive semiconductor.

6. The hybrid photoactive device according to either claim 1 or 2, wherein the chlorosomes are chlorosomes of *C. aurantiacus*.

7. The hybrid photoactive device according to claim 6, wherein the chlorosomes are the RC$^-$ chlorosomes of *C. aurantiacus*.

8. The hybrid photoactive device according to claim 2, wherein the chlorosome baseplate is contiguous to a light receiving surface of the photoactive semiconductor.

9. The hybrid photoactive device according to claim 2, wherein the chlorosome baseplates are spaced a short distance from the photoactive semiconductor.

10. The hybrid photoactive device according to either claim 1 or 2, wherein the chlorosomes are adherent to a transparent plate overlying a light receiving surface of the photoactive semiconductor.

11. The hybrid photoactive device according to claim 10, wherein the chlorosomes are adherent to a hydrophobic surface of the transparent plate.

12. The hybrid photoactive device according to claim 11, wherein the plate is a borosilicate plate.

13. The hybrid photoactive device according to claim 3, wherein the photoactive semiconductor diminished response is in a blue region of the visible spectrum and the chlorosomes respond to light thereon in the blue region of visible spectrum by emitting light outside the blue region.

14. The hybrid photoactive device according to claim 13, wherein the light emitted by the chlorosomes is light in the 800nm near infrared region of the visible spectrum.

15. A method of making a hybrid photoactive device including:

(a) providing photosynthetic chlorosome-containing bacteria,

(b) extracting the chlorosomes from the bacteria,

(c) providing a photoactive semiconductor, and

(d) locating the chlorosomes proximate a light receiving surface of the photoactive semiconductor.

16. The method according to claim 15, wherein step (d) comprises orienting at least the majority of chlorosomes in a light emitting direction toward the photoactive semiconductor.

17. The method according to claim 15, wherein the chlorosomes comprise a cytoplasmic membrane sack of photo-sensitive molecular structures and a baseplate, and step (d) comprises orienting at least a substantial number of the chlorosomes with their baseplates facing the photoactive semiconductor and their cytoplasmic sack facing away from the photoactive semiconductor.

18. The method according to claim 15, wherein step (a) comprises providing *C. aurantiacus*.

19. The method according to claim 18, wherein step (b) comprises extracting the RC$^-$ chlorosome from *C. aurantiacus*.

20. The method according to claim 16, wherein step (d) comprises locating the chlorosomes contiguous with a light receiving surface of the photoactive semiconductor.

21. The method according to claim17, wherein step (d) comprises locating the chlorosomes with their baseplates contiguous with a light receiving surface of the photoactive semiconductor.

22. The method according to claim 17, wherein step (d) comprises locating the chlorosomes spaced from and proximate the light receiving surface of the photoactive semiconductor.

23. The method according to either claimM15 or 16, wherein step (d) comprises providing a transparent plate, securing the chlorosomes to the transparent plate and positioning the transparent plate overlying a light receiving surface of the photoactive semiconductor.

24. The method according to claim 23, wherein providing the transparent plate further comprises providing a transparent plate having a hydrophobic surface and securing the chlorosomes further includes securing the chlorosomes to the hydrophobic surface.

25. The method according to claim 24, wherein providing the transparent plate comprises providing a borosilicate plate.

26. The method according to claim 15, wherein step (c) comprises providing a photoactive semiconductor having a light response that is diminished at a first range of light wavelengths, and step (a) comprises choosing a chlorosome having light response that is enhanced at a second range of light wavelengths that coincides, at least in part, with the first range of light wavelengths and light emission outside the first range of light wavelengths.

27. The method according to claim 26, wherein choosing a chlorosome comprises force adapting bacteria with chlorosomes with the light response enhanced at the second range of light wavelengths and light emission outside the first range.

28. The method according to claim 27, wherein force adapting comprises design of experiment determination of environmental factors forcing adaptation of bacteria based upon multiple environmental variables applied to sample bacteria.

29. The method according to claim 28, wherein the sample bacteria are of the same species.

30. The method according to claim 28, wherein the sample bacteria are *C. aurantiacus*.

31. The method according to claim 28, wherein force adapting comprises calculating a figure of merit for chlorosomes of the bacteria and identifying environmental factors resulting in an acceptable figure of merit.

32. The method according to claim 31, wherein the figure of merit is:

$$\mathrm{FoM} = \frac{\%T_{440\ (\mathrm{Bchl\ c\ Soret})}}{\%T_{440\ (\mathrm{Bchl\ c\ Soret})} + \%T_{460\ (\mathrm{Carotenoid})}} * \frac{\%T_{795\ (\mathrm{Bchl\ a\ Baseplate})}}{\%T_{740\ (\mathrm{Bchl\ c\ Oligomeric\ Qy})}}.$$

33. The method according to claim 26, wherein the photoactive semiconductor diminished response is in the blue region of the visible spectrum and force adapting the bacteria comprises force adapting the bacteria to have chlorosomes responsive to light in said blue region to emit light outside said blue region.

34. The method according to claim 33, wherein the light emitted by the chlorosomes is light in the near infrared region of the visible spectrum.

35. A method of making a hybrid device comprising a biological component comprising the steps of:

(a) identifying performance characteristics of the biological component,

(b) from the performance characteristics of the biological component calculating a figure of merit for the biological component,

(c) for adaptations of the biological component calculate the figure of merit, and

(d) upon calculating an acceptable figure of merit for the biological component incorporating similar adaptations of the biological components having substantially that figure of merit into the hybrid device.

36. The method according to claim 35, further comprising:

(e) force adapting the biological component to produce the adaptations.

37. The method according to claim 36, wherein step (e) comprises force adapting the biological component by varying environmental factors effecting the development of the biological component.

38. The method according to claim 37, wherein varying environmental factors comprises varying multiple environmental factors as variables in a design of experiment analysis of the biological specimen.

39. The method according to claim 38, wherein varying the environmental factors comprises developing a group of the biological components in an environmental chamber having control of the environmental factors for individual test specimens containing one or more of the biological components.

40. A method of analysis of a component or device that is at least partly biological, comprising the steps of:

(a) growing biological components of the device under controlled environmental conditions,

(b) varying the environmental conditions under which the biological components are grown,

(c) producing outputs from inputs to the biological components grown, and formulating transfer functions for the components,

(d) observing variances in transfer functions corresponding to the varied environmental conditions under which the biological components were grown, and

(e) choosing environmental factors for the growth of the biological components to arrive at desired transfer functions for the biological components.

41. A method of making biological components for hybrid devices of biological and nonbiological components comprising:

(a) for the desired performance of the biological components deriving a figure of merit,

(b) growing organisms from which the biological components is to be gathered,

(c) controlling a plurality of environmental factors under which the organisms are grown including:

(i) subjecting the growing organisms to several alternate values of several controlled environmental factors,

(d) monitoring the figure of merit of the biological components grown in step (b),

(e) repeating steps (b), (c) and (d) until a desired figure of merit of the biological components has been achieved.

42. The method according to claim 41, wherein step (b) comprises providing a multiple input, multiple output environmental chamber and growing the biological components therein.

43. The method according to claim 42, wherein step (d) comprises applying a design of experiments analysis to the environmental factors and the figure of merit.